



## **WATER RESOURCES RESEARCH GRANT PROPOSAL**

**Project ID:** 2005OR64B

**Title:** Determining Spatial and Temporal Variability of Groundwater Nitrate in the Southern Willamette Valley, OR

**Project Type:** Research

**Focus Categories:** Nitrate Contamination, Management and Planning, Hydrogeochemistry

**Keywords:** Groundwater, Willamette Aquifer, Nitrate

**Start Date:** 03/01/2005

**End Date:** 02/28/2006

**Federal Funds:** \$15,000

**Non-Federal Matching Funds:** \$31,075

**Congressional District:** Oregon

**Principal Investigator:**  
Roy Haggerty

### **Abstract**

The Oregon Department of Environmental Quality (DEQ) recently designated the Southern Willamette Valley (SWV) as a Groundwater Management Area (GWMA) due to concerns over high groundwater nitrate concentrations. Data indicate that high groundwater nitrate concentrations may depend upon the underlying geologic formation present at the site (Aitken et al., 2003). Other factors likely to affect groundwater nitrate concentrations include overlying land management practices, specifically the application of nitrogen fertilizer, the presence or absence of irrigation, and the presence of human or animal waste. It is regionally important to understand how quickly and to what extent different land management practices affect groundwater nitrate concentrations. This is especially relevant because the GWMA committee will need to determine the most suitable best management practices (BMPs) for implementation.

We will investigate temporal variations of groundwater nitrate under different land management practices in the SWV to determine how BMPs are likely to impact nitrate concentrations. In determining the extent of seasonal groundwater nitrate variability, we will sample ~20 shallow wells (< 50 ft) on a monthly basis to determine how variability

differs based on overlying land use and geologic unit. It has been shown that there is a seasonal variation in nitrate leached below the root zone (Faega et al., 2004), but limited high quality data are available to indicate if a seasonal fluctuation occurs in groundwater nitrate. Using land management data and our groundwater nitrate data, we will calibrate and validate a model of surface and near surface variables that affect the distribution and concentrations of nitrate. Variables included in the Soil Water Assessment Tool (SWAT) model include land use, climate, irrigation practices, soil type and depth, nitrogen inputs, crop type, and aquifer properties. The model will be used to examine how long and to what extent BMPs must be implemented to affect groundwater nitrate concentrations. A predictive model along with monthly nitrate data to guide future monitoring efforts will be invaluable to both management and future research in the area. All maps, major model findings, and graphs of geochemical data will be made publicly available via the PI's Willamette Silt website (<http://science.orst.edu/~haggertr/WS/>).